



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA STREET, N.W., SUITE 2900  
 ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-335/95-02 and 50-389/95-02

Licensee: Florida Power and Light Company  
 9250 West Flagler Street  
 Miami, FL 33102

Docket Nos.: 50-335 and 50-389

License Nos.: DPR-67 and NPF-16

Facility Name: St. Lucie Plant Units 1 and 2

Inspection Conducted: February 13-17, 1995

Inspector: J. J. Lenahan 3/17/95  
 J. J. Lenahan, Reactor Inspector Date Signed

Approved by: J. J. Blake 3/17/95  
 J. J. Blake, Chief Date Signed  
 Materials and Processes Section  
 Engineering Branch  
 Division of Reactor Safety

SUMMARY

Scope:

This routine, special announced inspection was conducted in the areas of repairs to the 2B2 Component Cooling Water Heat Exchanger, review of concrete expansion anchor installation procedures, the licensee's Nuclear Safety Speakout program and licensee action on previous inspection findings.

Results:

In the areas inspected, violations or deviations were not identified.

Enclosure

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*C. Burton, Plant Manager
- \*R. Dawson, Licensing Manager
- \*J. Dyer, Maintenance Quality Control (QC) Supervisor
  - A. Fata, Civil Engineering Supervisor, Site Nuclear Engineering
- \*R. Gil, Chief Civil Engineer, Nuclear Engineering
- \*J. Holt, Licensing Engineer
  - J. Luchka, Site Supervisor, Nuclear Safety Speakout Program
  - T. Luke, Manager, Component Support and Inspection, Nuclear Division
  - C. Miller, Mechanical QC Inspector
- \*C. Wasik, Licensing Engineer, Site Nuclear Engineering

Other licensee employee contacted during this inspection included engineers, technicians, and administrative personnel.

#### NRC Resident Inspectors

- \*R. Prevatte, Senior Resident Inspector
- \*M. Miller, Resident Inspector

#### \*Attended exit interview

### 2.0 Repairs to Unit 2 2B Component Cooling Water Heat Exchanger - (62700)

The Unit 2 2B component cooling water (CCW) heat exchanger was retubed during the Fall 1990, refueling outage. After the work was completed, a hydrostatic test was performed on the heat exchanger. The test identified a defect in the weld between the outer shell and the tube sheet on the west end of the heat exchanger. This problem was documented on nonconformance report (NCR) number 2-428. The weld repair was completed and another hydrostatic test was performed. The retest showed the repaired weld was acceptable, however, the weld between the outer shell and the tube sheet on the east end of the heat exchanger failed the retest. NCR 2-434 was issued to document and disposition the repair of the weld on the east end of the heat exchanger. The NRC Resident Inspectors reviewed portions of the weld defect evaluation, witnessed portions of the weld repair, and reviewed closeout of the nonconformance reports, as documented in NRC Inspection Report numbers 50-335,389/90-28 and 90-30.

The weld defects, which occurred in original vendor welds, resulted in delaying return of the 2B CCW heat exchanger to service during startup following the end of the Fall 1990 refueling outage. The licensee requested a Temporary Waiver of Compliance to allow ascension to Mode 2 without the "B" train of the CCW system in service. The request is documented in FP&L letter L-90-413, dated November 23, 1990. The request was verbally granted by NRC on November 23, 1990, and a confirming NRC letter was issued on November 26, 1990.

During the current inspection, the inspector reviewed records relating to repair, inspection and evaluation of the repairs to the bimetallic welds between the outer shell (carbon-steel) shell and tube sheet (aluminum - bronze). The following documents were reviewed:

- NCR-2-428 which documents disposition of the defective weld of the shell/tube sheet on the west end of CCW heat exchanger 2B. Documentation included liquid penetrant (PT) testing of the original vendor weld, mapping of indications in the weld, vendor weld data, engineering evaluation of the weld, and weld repair recommendations.
- Work Request XA9011192202441 which documents repair of the shell/tube sheet weld on the west end of the CCW 2B heat exchanger. The work request specified defective weld material was to be removed and repaired in accordance with NCR-2-428.
- NCR 2-434 which documents disposition of the defective weld at the shell/tube sheet on the east end of CCW heat exchanger 2B. Documentation includes results of PT testing of the vendor weld, mapping of indications, vendor weld data, engineering evaluation, and weld repair recommendations.
- Work Request XA901119225512 which documents repair of the shell/tube sheet weld on the east end of the CCW 2B heat exchanger. The work request specified the defective weld material was to be removed and repaired in accordance with NCR 2-434.
- Welding Procedure Specification WPS-21, dated March 1, 1990, for gas tungsten arc welding (GTAW) of Aluminum bronze to carbon steel with AWS No. ER CUAL-A2 weld filler material. A Note on WPS-21, Revision 1 states: "This WPS is limited to use on the turbine cooling water heat exchangers at (Plant St. Lucie) PSL." A technical review showed that the WPS was also applicable to the CCW heat exchanger shell/tube sheet welds since they are fabricated from the same materials, base metal thickness, and used the same filler metal and welding process. The note was removed when Revision 2 (the current revision) to WPS was issued in November 1992. Using WPS 21 for the CCW heat exchanger weld repair with the restrictive note was an administrative oversight on the part of the licensee; however it does not affect the technical adequacy of the WPS or the weld repair, and has no safety significance.
- Weld Travelers, filler metal requisitions, and quality control inspection records for NDE (PT and hydrostatic exams) of both repaired welds.
- NCR 2-435 which documents use of a welder not qualified to WPS-21 to perform the repair of the weld on the west end of the CCW heat exchanger.

- Licensee Event Report number 90-005, dated December 18, 1990, Component Cooling Water Heat Exchanger Pinhole Leak Due to Tube Sheet Weld Degradation.
- Failure Analysis of CCW Heat Exchanger 2B weld, dated December 4, 1990. The analysis was performed on a sample of weld material obtained from the defective vendor weld on the west end of the heat exchanger. The failure was attributed to lack of fusion and cracking along the fusion line in the weld.
- Engineering Evaluation JPN-PSL-SEMJ-90-063, Revision 2, dated December 10, 1990, Evaluation of 2B CCW Heat Exchanger Tube Sheet/Shell weld. The engineering evaluation showed that the repaired weld was functional. The stresses acting on the weld joint are well below code allowable limit values. In addition, even if the weld would fail and begin to leak, the CCW system is equipped with an automatic makeup system which is far in excess of the previously observed leakage rate.

The inspector concluded that the licensee's actions to evaluate and repair the defective welds in the 2B CCW heat exchangers complied with good industry practices and NRC requirements, with the exception of the fact that a welder who had not been qualified to the welding specification, WPS-21, performed the initial weld repair. This problem was detected under the licensee's quality control/quality assurance program and corrective action was implemented.

In their November 23, 1990, request for Temporary Waiver of Compliance, the licensee committed to perform NDE of the full circumference of the shell/tube sheet welds on the 2B CCW heat exchanger during the next refueling outage in Spring, 1992. The inspector reviewed the results of the NDE inspections summarized in Aptech Engineering Services report: "Flaw Evaluation of Inspection Indications in 2B Component Cooling Water Heat Exchanger Girth Welds at St. Lucie Unit 2," dated May 1992. Ultrasonic testing was the NDE method used. The UT examination resulted in identification of 43 weld indications in the welds, 21 in the east weld and 22 in the west weld. The licensee evaluated the indications using the methods for flaw acceptance criteria specified in IWB-3640 of ASME Section XI. All reported weld indications satisfied the intent of the Code. The inspector concluded that the licensee's evaluation of weld indications complied with NRC requirements.

The inspector also performed a walkdown inspection and examined the Unit 1 and 2 CCW heat exchangers (1A, 1B, 2A, and 2B). The inspector verified that the heat exchangers were not deteriorated or leaking; however, during the walkdown in the Unit 1 CCW pit and the Unit 2 CCW building, the inspector identified the following issues:

- Portions of a horizontal support on the CCW supply line to the 1B CCW heat exchanger was severely corroded. Approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  of the metal on the bottom flanges of the two horizontal support members have been corroded away.
- Several embedded plates in the Unit 1 pit were covered with water. The concern involving these plates is that the Nelson studs which anchor the plates to the concrete may corrode. The Nelson studs can not be visually inspected since they are covered by concrete, and the corrosion damage would not be evident; however, the corrosion would affect the structural integrity of the plates.
- The CCW supply piping to the 2A CCW heat exchanger was corroded in some areas. The corrosion had progressed into pitting in a few areas.
- Pipe support hardware on several supports in the Unit 1 pit exhibited signs of corrosion damage.
- The protective coatings (paint) on structural steel, pipe supports, embedded plates, and piping is deteriorated in some areas in the Unit 1 CCW pit and Unit 2 CCW building.

With the exception of the above, item the inspector concluded that the overall condition of the CCW piping, heat exchanger, pumps, structural steel and other hardware was good.

Within the area inspected, violations or deviations were not identified.

3. Drilled - In Expansion Anchors in Concrete - Units 1 and 2 (37550)

The inspector reviewed the licensee's program for design, installation, and inspection of various types of concrete expansion anchors used in safety-related installations at St. Lucie. Acceptance criteria utilized by the inspector include the licensee's response to NRC IE Bulletin 79-02, Pipe Support Base Design Using Concrete Expansion Anchor Bolts, for Unit 1, dated July 2, 1979, and July 5, 1979, and Units 2 FSAR Section 3.9.B.

The licensee's response to IEB 79-02 was examined during inspection documented in NRC Inspection Report numbers 50-335/79-22, 50-389/79-16, 50-335/87-26, 50-389/87-25, 50-335,389/88-28, and 50-335,389/91-02. In addition the concrete expansion anchor program for Unit 2 was reviewed during licensing of Unit 2 by the NRC Office of Nuclear Reactor Regulation. Concrete expansion anchor installation for Unit 2 was inspected during various NRC inspections prior to start-up of Unit 2. An investigation of concrete expansion anchor installation practices for Unit 1 was conducted by NRC in 1977. The results of this investigation which resulted in identification of improper concrete expansion anchor practices, and three violations (designated Items of Noncompliance in 1977) are documented in NRC Investigation Report number 50-335/77-10.

The inspector reviewed FP&L Specification CN-2.24, Drilled-In Expansion Type Anchors in Concrete, Revision 8. This specification which covers wedge type expansion anchors, sleeve type anchors, and undercut anchors, includes requirements for anchor materials, design criteria, installation, and quality control. The inspector also reviewed calculation number PSL-BFJC-90-0009, Revision 0, Calculation for Specification CN-2.24. This calculation was used to determine the ultimate tension and shear capacities for anchors, anchor embedment, edge distance, and anchor spacing requirements. The criteria in Specification CN-2.24 is based on the results/conclusion from this calculation. The ultimate anchor capacities are based on the results of on-site testing conducted by the licensee.

The inspector reviewed two plant change/modification (PC/M) packages which involved installation of concrete anchors:

- PC/M 026-191, Modification of Unit 1 Pressurizer Relief Valve Discharge Pipe Supports, affected 33 supports on the piping. The support modifications were required to address increased piping loads calculated to address item II.D.1 of NUREG 0737. The support modifications involved resetting or replacing spring hangers, replacing a snubber, removing a support, and replacing a loose anchor in the baseplate of a support. The support with the loose anchor was support number RC-005-36, which is a snubber. The loose anchor was identified during the original walkdown inspection for IEB 79-02. The loose anchor was noted on the support drawing, drawing number RC-005-36, Sheet 1 of 2. During the original IEB 79-02 walkdown inspections, pipe supports which had loose or incorrectly installed anchors were evaluated. If the support would qualify and could meet the safety factor required by IEB 79-02, the anchor was not replaced, but a note was placed on the support drawing stating the anchor deficiency and referencing the IEB 79-02 Report. If the support could not be qualified with the defective anchor, the defective anchor was replaced.

The inspector reviewed calculation number PSL-IFJC-91-012, Revision 1. The calculation was prepared to evaluate pipe support RC-005-36 for the increased loads from the pressurizer discharge piping required by NUREG 0737. The calculation showed that the support members were adequate for the increased piping loads, but that the loose anchor required replacement. The licensee selected a  $\frac{3}{4}$  inch diameter maxi-bolt for replacement of the loose anchor. The new anchor group was checked for increase in load due to prying (baseplate flexibility) action. The licensee's response to IEB 79-02 stated that prying action had not been evaluated for each baseplate. The licensee analyzed 45 supports under IEB 79-02 and determined that the prying effect was negligible. The check for prying for the redesigned baseplate for support number RC-005-36 also showed no prying action. The inspector reviewed drawing number JPN-026-191-017 which specified installation of the  $\frac{3}{4}$  inch diameter anchor in place of the loose anchor. The inspector also reviewed the QC inspection report which documented installation and setting of the new

anchor in accordance with CN-2.24. The inspector concluded that the support redesign and new anchor installation complied with NRC requirements.

- PCM 030-191, ICW Strainer Support Repair, involved replacement of existing supports which had been damaged by corrosion. This modification involved replacement of the existing strainer supports with new stainless steel members. The licensee selected stainless steel maxi-bolt anchors for this modification. The inspector reviewed drawing numbers JPN-030-191-001 and 002 which show the modification details. The inspector also reviewed calculation number PSL-BFJC-91-004, Revision 1, Qualification of Stainless Steel Drillco Maxi-Bolt Concrete Expansion Anchors. This calculation specifies the installation requirements and the setting torque for the new anchors.

Specification CN-2.24 does not include the requirements for the stainless steel maxi-bolts. The anchors for this pc/m package involved installation of clip angles to reinforce some exist concrete walls to support the ICW stainer loads for the modified supports. Prying action was not considered since it was not applicable to this installation. The inspector examined QC inspection reports and verified that the new anchors were installed in accordance with the criteria specified in the calculation.

The inspector concluded that the licensee's program for installation of concrete anchors complies with NRC requirements. Discussions with licensee engineers disclosed that very few concrete anchors have been installed on site over the last few years.

Within the areas inspected, no violations or deviations were identified.

#### 4.0 Nuclear Safety Speakout Program - 37550

The inspector reviewed the log of concerns identified by various individuals to the Nuclear Safety Speakout Staff and selected for review those involving engineering/design concerns. The following files were reviewed:

<u>File Number</u>	<u>Status</u>
NSS-PSL-92-030	Closed
NSS-PLS-92-031	Closed
NSS-PLS-92-032	Closed
NSS-PSL-93-085	Closed
NSS-PSL-93-086	Closed
NSS-PSL-93-087	Closed
NSS-PLS-93-088	Closed
NSS-PSL-93-089	Closed
NSS-PSL-93-090	Closed
NSS-PSL-93-091	Closed
NSS-PSL-93-092	Closed
NSS-PSL-94-100	Open

NSS-PSL-94-101	Open
NSS-PSL-94-102	Closed
NSS-PSL-94-103	Open
NSS-PSL-94-105	Open

The inspector determined that the licensee's actions to investigate the concerns were adequate, and that the concerns were investigated and resolved in a timely manner. The Nuclear Safety Speakout Staff performs investigations of the identified issues. When necessary the concern is provided to the appropriate organization for their input in its resolution. Confidentiality is maintained regarding the identify of the individual expressing the concern.

The inspector reviewed the licensee's evaluation of the closed concerns listed above, and recommendations, if any, to resolve the concerns. The licensee's reviews were thorough and technically adequate to resolve the individual concerns.

In the areas inspected, violations or deviations were not identified.

5.0 Licensee Action on Previous Inspection Findings (92701 and 92702)

5.1 (Closed) Violation Item 389/94-08-01, Failure to Follow Corrective Action Procedures

The licensee responded to the Notice of Violation in a letter number L-94-106 dated May 6, 1994. The licensee attributed the causes of the violation to be a personnel error on the part of the construction services worker who identified the damaged pipe spool piece. The licensee initiated nonconformance report (NCR) 044-293-3025 to properly document, evaluate, and disposition the damaged pipe and pipe support end piece. The licensee's Construction Services Manager met with the construction services field personnel and discussed the importance of initiating nonconformance reports for root cause identification and determination of safety significance. The licensee has also revised their corrective action program by implementing the St. Lucie Action Report (STAR) which streamlines and clarifies the corrective action program. The licensee is currently reviewing the STAR program to implement lessons learned from the last Unit 1 refueling outage. This program has been reviewed by the NRC resident inspectors.

5.2 (Closed) Violation Item 389/94-08-02, Inadequate Inspection and Evaluation of Effects of Waterhammer Event on SRV and PORV Discharge Piping

The licensee responded to the Notice of Violation in letter number L-94-106 dated May 6, 1994. The licensee determined that failure to initiate an NCR was the root cause of this violation. A contributing factor was that a non-conservative assumption was made when estimating the magnitude of the waterhammer force which damaged the piping. The corrective actions included functional testing of all snubbers on the PORV and SRV discharge piping (the functional test results were reviewed





by the inspector during inspection 94-08), and visual inspection of the welds on the PORV and SRV discharge piping. The inspector reviewed the results of the visual weld inspections which were initiated by the licensee at the request of NRC after the violation was identified. The licensee also performed liquid penetrant exams of selected welds and ultrasonic testing of Nozzle welds. The results of these inspections are documented in an FP&L Memo dated March 15, 1994, Subject: Augmented Nondestructive Examination Performed on the St. Lucie Unit 2 Pressurizer Relief and Safety Lines. The inspector also reviewed the report titled Engineering Evaluation for the Pressurizer PORV and SRV Piping and Supports, dated March 24, 1994, which was completed to document the inspection and evaluations performed on the SRV and PORV discharge piping. The licensee prepared two procedures to provide guidance to plant and engineering personnel regarding field walkdown and evaluations to be performed following a transient event. The inspector reviewed the procedures which included FP&L Standard No. STD-M-031, Revision 1, Piping System/support Walkdown and Evaluation Requirements following an Unanticipated Event, and FP&L Standard No. Std-N-003, Revision 0, System/Component and Evaluation Requirements following an Unanticipated Transient Event. The licensee conducted training on identification of waterhammer and cavitation, assessment and prevention. The inspector reviewed the training material provided to their personnel.

- 5.3 (Closed) Unresolved item 389/94-08-03, Quality Level of PORV and SRV Discharge Piping. The licensee amended their Final Safety Analysis Report to clarify the design basis of the PORV and SRV discharge piping, and the quench tank. The piping and tank is classified as quality group D (Non-Safety Related); however, the piping and pipe supports are classified as Seismically Designed because the supports were utilized in the stress analysis to qualify the Quality Level A, Seismic Category 1 piping upstream of the Class D piping.

6. Exit Interview

The inspection scope and results were summarized on February 17, 1995, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.